

FACILITY DESIGN CHECKLIST

Building: _____ Rooms: _____

Date: _____ Prepared By: _____

Project: _____

Work Order Number: _____

GENERAL CONSIDERATIONS

1. This checklist is to accompany the completed Work Order
2. Provision of complete specifications for all equipment is crucial. Complete Attachment A entitled EXISTING EQUIPMENT LIST and provide catalog cuts/specifications sheets for all equipment to be procured. _____
3. Consider those tasks, which need to be kept away from the flow of traffic. Provide for them in areas away from doorways. This is especially true of hood locations. See Attachment B for guidance. _____
4. The ideal space between facing laboratory benches is 60". Aisle ways may not be less than 28" in width per requirements. _____
5. All space should be designed with handicap and safety guidelines in place. Do any of the occupying staff have specialized needs? _____
6. Administrative, entryways, corridors and toilets should be designed with handicap guidelines in place. Do any of the occupying staff have specialized _____
7. Is there sufficient provision for transporting heavy or large equipment to the area? Is the elevator large enough for all equipment? _____
8. Is any equipment in a weight category, which may exceed elevator lift capacity or require additional floor support? _____
9. Flammables are stored in flammable storage cabinets as long as a total of less than 60 gallons is kept. Flammable storage equaling or exceeding 60 gallons requires a flammable storage room or building with an appropriate fire extinguishing system, dikes, fire rated doors and explosion-proof fixtures. Up to three 60-gallon cabinets allowed in laboratories. _____
10. Adequate systems must be in place to autoclave biological waste. Some buildings have available an autoclave service for low hazard wastes. Specific guidance may be obtained from the Biological Safety Officer at extension 1904. BSL-3 laboratories are covered elsewhere in this checklist. _____
11. Both safety showers and eyewash stations may be provided in laboratories. Is there a particular area where close proximity to either of these may be required (i.e. chemical fume hoods)? _____
12. Both biological safety cabinets and chemical fume hoods may require up to six months to specify, order, deliver and install. This time must be programmed into the planning process. _____
13. Suspended ceilings are preferred in all but BSL-3 laboratories. Are there any laboratory areas in which suspended ceilings may not be appropriate? (Consider the material of ceiling tile) _____
14. Are any special security measures required (e.g. Cardkey, punch locks)? NOTE THAT RADIOACTIVE MATERIALS AND ANIMALS MUST BE SECURE FROM UNAUTHORIZED REMOVAL AT ALL TIMES. _____
15. Administrative areas – How many people will occupy and is there any high heat generating equipment planned, i.e. servers? _____
16. Sprinkler system must be installed in all buildings over 2000 square feet. Is there any water sensitive equipment or records in the building? Provide mechanical space for sprinkler piping requirements or Inergen tank storage. _____
17. Equipment rooms for lab equipment (freezers, centrifuges, etc.) are highly recommended. Consider equipment/storage room combination for administrative areas (copier, server, supply storage, high volume printers). _____
18. Any requirements for raised floor construction? _____

LABORATORY DESIGN

This is the area in which the researcher is most interested and most instrumental. Take sufficient time to think through each question so that the best possible layout can be designed. Laboratory design will comply with NIH design criteria and policy.

- ___ 1. Cabinets are kept in stock at NCI-FCRDC. These are standard, heavy-gauge metal, floor-mounted casework. Position these cabinets in the laboratory space in their desired locations. Pay attention to the mix of cabinets with drawers and those with doors. NOTE: CABINETS THAT ARE NOT LISTED IN THE NCI-FCRDC SHOP STOCK CATALOG MAY TAKE UP TO SIX MONTHS TO PROCURE.
- ___ 2. The counter tops are routinely fabricated with a Formica laminate over a plywood base. Is there a requirement for other counter top compositions?
 - A. Epoxy Resin _____
 - B. Stainless Steel. _____
 NOTE: NONSTANDARD COUNTER TOPS WILL TAKE ADDITIONAL TIME TO PROCURE AND INCREASE THE COST OF THE RENOVATION.
- ___ 3. Do any of the cabinets require locks? Consider security of personal belongings and requirements to secure needles, syringes and controlled substances. _____
- ___ 4. Include knee space in all areas where laboratory work will be done while sitting. Consider ergonomics in general (OHS staff can provide guidance). _____
- ___ 5. Is there a requirement for any of the cabinet space to be vented? This may be necessary for storage of highly volatile substances. _____
- ___ 6. Should the unused wall areas have either wall-hung cabinets or adjustable shelving? _____
- ___ 7. Are any special floor/ceiling/wall coverings required? _____
- ___ 8. Should laboratory doors have windows (recommended)? Fire Codes limit these windows to 100 square inches. _____
- ___ 9. Check to verify that all doors are wide enough to allow passage of equipment. Minimum door width is 42", consider 36" active door with passive panel of 12" or more. _____
- ___ 10. Is there a requirement for offices? Are windows required in the office doors? _____
- ___ 11. Will radioisotopes, chemicals, or hazardous biologicals be used? The waste must be held in a secure location for pick up.
Where will the following be stored:
 - A. Radioactive waste? _____
 - B. Chemical waste? _____
 - C. Biological waste? _____
- ___ 12. Will support from Central Glassware be required? Where will the glassware be stored? _____

MECHANICAL CONSIDERATIONS

- ___ 1. Do all of the laboratories require water? Hot and cold? _____
- ___ 2. Does any equipment require a redundant system? _____
- ___ 3. Any temperature or humidity requirements? Independent control? _____
- ___ 4. Is reverse osmosis (or distilled) water required? _____
- ___ 5. Does the endpoint require additional polishing? _____
 - A. ASTM Standard? _____
 - B. Cap Standard? _____
 - C. Who to provide equipment? _____
- ___ 6. Is there a requirement for clean steam humidification? _____
- ___ 7. Is there a requirement for cup sinks on the counter tops? Aspirators? _____
- ___ 8. Can the drain lines for the sinks be iron, or should they be plastic or glass for an acid waste system? _____
- ___ 9. What size should the sinks be? _____
- ___ 10. Will any chemicals be used which would corrode stainless steel sinks? _____
- ___ 11. Does any equipment require a floor drain? _____
Note: Floor drains must meet Ft. Detrick Non-Domestic Waste Water Control Policy.
- ___ 12. Is any equipment water cooled? Is a chilled water supply required? _____
Consider the temperature of chilled water.
- ___ 13. Is HVAC on BAS system? _____

- ___ 14. Does any equipment require ventilation/exhaust (vacuum pumps, special purpose hoods)? _____
- ___ 15. HVAC fail safe mode? _____
- ___ 16. Is Lab to be positive or negative to surrounding area? _____
- ___ 17. Other laboratory utility requirements/locations:
 Natural gas (propane) _____
 Compressed air _____
 Vacuum _____
 Gaseous nitrogen _____
 Carbon dioxide _____
 Steam _____
 Liquid nitrogen _____
 Other _____
- ___ 18. Are there any special air filtration requirements supply/exhaust? _____
- ___ 19. What utilities are to be at biological safety cabinets (gas strongly discouraged) or chemical fume hoods? _____
- ___ 20. Is an autoclave to be installed? Who will provide? _____
 A. Quality steam required (filtered or clean steam) _____
 B. Chamber dimensions: _____
- ___ 21. Are cage & rack washers to be installed? _____
 A. Chamber dimensions _____
 B. Number of doors and type _____
- ___ 22. Bio waste kill system required? _____
 A. Special door interlocks? _____
 B. Recorder required? _____
 C. Water ejector/booster pumps? _____
 D. Contaminated drain/vent? _____
- ___ 23. SEPP approved Hoods:
 A. Hood Type
 Biological Safety Cabinet:
 Class I _____
 Class II _____
 Type A _____
 Type B _____
 Class II _____
 Chemical Fume
 Class I _____
 Class II (std.) _____
 Class III _____
 Neocropsy or special purpose hoods
 B. Put all hoods on alarm.
 C. Interlock all hoods with exhaust fans.
 D. Exhaust fans shall fail open for chimney affect.

ELECTRICAL CONSIDERATIONS

- ___ 1. List all equipment to be installed in laboratories and offices on Attachment A. Include voltage, amperage, and type (configuration) of receptacle. Also identify those items requiring connection to the scientific alarm system. Items left blank will prompt the Engineering Department to research the required information.
- ___ 2. How many 110V outlets are required on the bench tops? _____
 Any special power requirements at lab benches? _____
- ___ 3. Is emergency power required? _____
- ___ 4. Any special security requirements? _____
- ___ 5. Are any special alarm systems required, i.e. oxygen deficiency? _____
- ___ 6. Is any equipment or process manipulation sensitive to:
 A. Vibration? _____
 B. Electromagnetic interference? _____
 C. Lighting (levels)? _____
 D. Power line disturbances? _____

- ___ 7. Are uninterruptible power or line conditioning required for any equipment? Identify. _____
- ___ 8. Are there any special lighting control requirements?
- A. Dimming _____
- B. Console control _____
- C. Separate switching? _____
- D. Light levels? _____

TELECOMMUNICATIONS

- ___ 1. Identify locations of telephone, fax, and modem jacks. _____
- ___ 2. Is a LAN hub is required, where will it be located and make provisions for all connections and terminations. _____
- ___ 3. Identify if desk or wall phones are required. _____
- ___ 4. Is an intercom or paging system required? _____

SPECIAL FACILITIES

Walk In Controlled Environment Room

- ___ 1. What temperature (range) must be maintained? _____
- ___ 2. How much space is required (sq.ft., height)? _____
- ___ 3. Will staff work in this room? _____
- ___ 4. Is filtered light required to protect sensitive materials _____
- ___ 5. How many electric receptacles are required?
- A. 110V _____
- B. 220V _____
- ___ 6. Is a sink required? What utilities required at sink? _____
- A. Cold water _____
- B. Hot water _____
- C. RO water _____
- ___ 7. Are any other utilities required? _____
- ___ 8. Is shelving required _____
- ___ 9. Is a framework required for column chromatography? _____
- ___ 10. What are temperature alarm parameters? _____

Dark Room

- ___ 1. Is a sink required? _____
- A. Kreonite? _____
- B. Stainless steel? _____
- ___ 2. Is a mixing valve required? _____
- ___ 3. Will a developing tank be installed? _____
- ___ 4. Will an automatic processing system be used (silver recovery system required)? _____
- ___ 5. Lighting Requirements:
- A. Safe light? _____
- B. Incandescent light? _____
- C. Fluorescent light? _____
- D. Switching arrangement? _____
- ___ 6. What paint color is required (flat black)? _____
- ___ 7. Is a revolving dark room door required? _____
- ___ 8. Will photographic chemicals be stored in the dark room? _____
- Where? _____
- ___ 9. Will a film hanger be required? _____
- ___ 10. Is space and electrical power required for a transilluminator? _____

BSL-3 Laboratories

BSL-3 laboratories are subject to design criteria described in the most recent edition of the DHHS publication entitled Biosafety in Microbiological and Biomedical Laboratories. Technical requirements are quite stringent, therefore, SEPP must be intimately involved with the design of any such facility to assure compliance with existing regulations and guidelines. All waste is autoclaved by laboratory personnel. The custodial work performed in other laboratories by the service workers is also done by laboratory personnel.

The following elements must be incorporated into the BSL-3 laboratory design.

- ___ 1. An airlock which is under negative pressure relative to the clean side and positive pressure relative to the BSL-3 laboratory. Pressurization monitors. _____
- ___ 2. Secure access, generally provided by combination punch lock _____
- ___ 3. Should Hood alarms and interlocks be provided? _____
- ___ 4. Double door autoclave which passes through the wall required? _____
- ___ 5. Will redundant HVAC systems be required? _____
- ___ 6. Is sink for hand washing near exit required? _____
 A. Hands free operated faucet? _____
- ___ 7. All penetrations must be sealed. _____
- ___ 8. BSL-3 laboratory must be certified by SEPP prior to use. _____
- ___ 9. Vacuum lines are protected with HEPA filters. _____

The following elements are optional in BSL-3 designs:

- ___ 1. Shower facilities. _____
- ___ 2. Pass-thru boxes. _____
- ___ 3. Storage for cleaning supplies. _____
- ___ 4. Is a door interlock system needed on ante room? _____

Animal Facilities

Animal facilities are designed in accordance with the most recent edition of the NIH Guide for the Care and Use of Laboratory Animals.

- ___ 1. How will security be maintained? _____
- ___ 2. Will animals be housed in isolators? _____
- ___ 3. Will a two corridor (clean/dirty) system be used? _____
- ___ 4. Shower in? Shower out? _____
- ___ 5. What will be the composition of room surfaces?
 A. Floors _____
 B. Walls _____
 C. Ceiling _____
- ___ 6. Are floor drains other than cagewash rooms required? _____
- ___ 7. Will automatic watering be used? _____
- ___ 8. Are waterproof receptacles required? _____
- ___ 9. Will hose hookups be required? Cold only, or hot and cold water? _____
- ___ 10. What are the dimensions of washing and sterilizing equipment? _____
- ___ 11. How will racks and cages be cleaned? _____
- ___ 12. Where will feed and bedding be stored? _____
- ___ 13. Where will dead animals be stored? _____
- ___ 14. Will animals be shipped from this facility? Where will they be prepared? _____
- ___ 15. Will an intercom system be required? _____
- ___ 16. Are animal rooms to be positive or negative in relationship to surrounding rooms. _____
- ___ 17. What are temperature and humidity requirements? _____
- ___ 18. Is space required for specialized equipment (e.g. x-ray generator)? _____
- ___ 19. What kind of lighting is required? _____
- ___ 20. Are timers required for lighting? _____
- ___ 21. What Animal Biosafety Level will be required? Consult with SEPP or refer to most recent edition of the DHHS publication entitled Biosafety in Microbiological and Biomedical Laboratories. _____
- ___ 22. Will there be a need for necropsy or special purposes hood. _____

CGMP FACILITIES

CGMP facilities are designed in accordance with the most recent addition of “NIH Design Policy and Guidelines” and FDA “Good Manufacturing Practices: 21CFR211”.

- ___ 1. What is area to be used for? _____
 A. Type of equipment _____
- ___ 2. Are there any temperature/humidity requirements? _____
- ___ 3. Classification of area? _____
 Class 1000
 Class 10,000
 Class 100,000
- ___ 4. Lab pressurization requirements _____
- ___ 5. Are there any minimum access requirements? _____
 For movement of equipment? _____
- ___ 6. Are there any special finishes required? _____
 Ceiling? _____
 Walls? _____
 Floors? _____
 Communications requirements
 Intercoms _____
 Telephone _____
 LAN _____
- ___ 7. Is a door interlock system required? _____
- ___ 8. What equipment requires alarming? _____
- ___ 9. Are there any requirements for:
 Hoods _____
 Glove Boxes _____
 Pass thru boxes _____
- ___ 10. Any special lighting requirements? _____
- ___ 11. Are there requirements for a sink? _____
- ___ 12. Utility requirements
 Electrical
 ___ 120 volt
 ___ 220 volt/1 phase
 ___ 230 volt/3 phase
 ___ 460 volt/3 phase
 ___ Emergency Power
 Mechanical
 ___ Domestic cold water
 ___ Domestic hot water
 ___ RO water
 ___ WFI
 ___ Plant Steam
 ___ Clean Steam
 ___ Vacuum
 ___ Gases
- ___ 13. Are redundant systems required? _____
- ___ 14. Are there requirements for use of flammable liquids in area? _____
- ___ 15. Are there requirements for dedicated gowning area? _____
- ___ 16. Are there requirements for room isolation for decon? _____
- ___ 17. Are there any temperature/humidity requirements? _____

CONTROL AND ALARMING1. Animal Facilities

Animal Rooms - Temperature Control
 Humidity Control
 Static Pressure Control
 Temperature Alarm and Monitoring
 Humidity Alarm and Monitoring
 Static Pressure Alarm and Monitoring
 Animal Room Watering Systems Alarming
 Light Control Start/Stop
 Light Monitoring

Air Handling Units - Fan Start/Stop
 Fan VSD Control
 Temperature Control
 Humidity Control
 Static Pressure Control
 Temperature Alarm and Monitoring
 Humidity Alarm and Monitoring
 Static Pressure Alarm and Monitoring
 Freeze Stat Alarm
 Smoke Detector Alarm
 Freeze Protection
 Filter Alarming
 Flood Alarm

Exhaust Fan - Fan Start/Stop
 Fan VSD Control
 Fan Status/Alarm

2. Laboratory Facilities - BL-1, BL-2, BL-3 and All Others

All Labs - Temperature Control
 Static Pressure Control
 Temperature Alarm and Monitoring
 Humidity Alarm and Monitoring
 Static Pressure Alarm and Monitoring

Air Handling Units - Fan Start/Stop
 Fan VSD Control
 Fan Status/Alarm
 Temperature Control
 Humidity Control
 Static Pressure Control
 Temperature Alarm and Monitoring
 Humidity Alarm and Monitoring
 Static Pressure Alarm and Monitoring
 Freeze Stat Alarm
 Smoke Detector Alarm
 Freeze Protection
 Filter Alarming
 Flood Alarm

Exhaust Fan - Fan Start/Stop
 Fan VSD Control
 Fan Status/Alarm

3. Building Utilities

Chillers -	Start/Stop Sequencing Operating Status Chilled Water Supply Temperature Alarming/Monitoring Chiller Pump Start/Stop Chiller Pump Status/Alarm Main Building Pump Start/Stop Main Building Pump Status/Alarm Emergency Shut down for chillers Refrigerant Monitor Alarming Flood Alarm
Cooling Towers -	Cooling Tower Temperature Control Cooling Tower Temperature Alarm Cooling Tower Fan Start/Stop Cooling Tower Fan Status/Alarm Cooling Tower Freeze Protection
Run Around Systems -	Pump Start/Stop Pump Alarming/Monitoring Temperature Control Temperature Alarming/Monitoring
Hot Water Pumps -	Start/Stop Status/Alarm System Temperature Alarming/Monitoring
Hot Water Converters -	Temperature Control Temperature Alarming/Monitoring Pump Start/Stop Pump Alarming/Monitoring
Steam Stations -	Pressure Alarm/Monitoring High/Medium/Low
Instrument Air -	Pressure Alarm/Monitoring
Domestic Hot Water -	Temperature Alarm/Monitoring
Building Air Pressure -	Pressure Alarm/Monitoring
Vacuum -	Vacuum Alarm/Monitoring
Building CO2 -	Pressure Alarm/Monitoring
Rodi Water Systems -	Status/Alarm
Whole Building Water Filter systems -	Status/Alarm

Monitor Building Equipment and Utilities with analog inputs where items are analog, digital inputs on contact closures, including but not limited to the following:

- CO2 Pressure
- Lab Air Pressure
- Instrument Air Pressure
- Vacuum
- Hi and Low Steam Pressure
- Domestic Hot Water Temperature and Pump
- Contacts on the RODI Water System

Monitor the Oxygen Detector System

- Flood Alarms in Attic and Utility Rooms

4.____ Scientific Equipment

Incubators -	Temperature Alarming/Monitoring
Freezers -	Temperature Alarming/Monitoring
Refrigerants -	Temperature Alarming/Monitoring
LN2 Freezers -	Status/Alarm
Walk-in Cold Rooms -	Temperature Alarming/Monitoring Supervised Panic Alarm with Local Audio-Visual Alarm
Walk-in Incubators -	Temperature Alarming/Monitoring Supervised Panic Alarm with Local Audio-Visual Alarm

5.____ Cardkey (Check with Peter Boving for requirements)

Doors-	In/Out Reader control - alarming
Utility doors-	In/Out Reader control – alarming

EQUIPMENT LIST

Attachment A

Project _____ Prepared By : _____ Date : _____
Building: _____ Lab/Office: _____ Contact Person: _____ Phone Number: _____ No. of people & Computers in Lab/Office: _____

NOTE - Attach catalog cuts/specification sheets for each item to be installed in lab or office

[illegible]

